**VILLANOVA ALUMNI AND FRIENDS HELP ES2 DEVELOP RELATIONSHIP WITH NATIONAL INDUSTRY GROUP**

In 2011, the National Science Foundation established the Industry Cooperative University Research Center for Energy-Efficient Electronic Systems (ES2), one of about 60 URCs managed by the NSF in strategic U.S. technology areas. A partnership between Villanova University, Binghamton University, The University of Texas at Arlington and the Georgia Institute of Technology, the ES2 is committed to developing technologies that will make data centers – the lifetime of today’s businesses – more energy efficient, sustainable and cost-effective to operate. The ES2 Villanova site leader is Alfonso Ortega, PhD, the University’s Associate Vice President for Research and Graduate Programs and James R. Birk Professor of Energy Technology. While pleased with the Center’s growth in its first year, Dr. Ortega recently made a connection with the data center industry that he believes will have a significant impact on ES2 for years to come.

Impressed by the Center’s research, ES2 industry partners encouraged Dr. Ortega to reach out to the 7x24 Exchange, one of the most important interest groups in the data center industry. Almost all of the current ES2 members belong to the organization and it was clear to them that there were obvious mutual benefits for the 7x24 Exchange to be aligned with the Center. Dr. Ortega took the first step in establishing the relationship by hosting the group’s regional meeting at Villanova in fall 2012. With the help of the 7x24 Exchange local chapter president and Villanova engineering alumnus Tom Reusche ‘81 BSEE, Dr. Ortega successfully hosted the group’s meeting and at the same time raised awareness of ES2 with a key industry group.

Of the meeting’s approximately 100 guests, Dr. Ortega was surprised to discover the number of loyal Villanova alumni in attendance. Present was alumnus Dennis Cronin ‘74, a 7x24 Exchange founder and one of the best known data center professionals in the country. Cronin is chief operating officer of Steel ORCA, a leader in the digital utility center industry. Dave Crocker, president of Steel ORCA (and interestingly, a former lacking coach for Villanova football), was also present and invaluable in helping to establish this collaborative relationship between the industry and academia. Dr. Ortega notes, “Dave Crocker, Dennis Cronin and Tom Reusche were key in bringing together the 7x24 Exchange and ES2. They seem to know everyone there is to know in the regional data center industry and are happy to make introductions. When I met them, I basically met everybody.”

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Crocker feels the connection is important and recognizes what Dr. Ortega brings to the table. “Dr. Ortega clearly appreciates the value of blending commercial, environmental and academic interests in the data center industry. The 7x24 Exchange provides a unique instrument that allows him to capitalize on the talents and interests in the academic community for the benefit of this business and socially critical industry,” he says. Crocin adds, “As a founder and the original sponsor of the 7x24 Exchange, I have always sought the engagement of the next generation to continually improve upon what we have accomplished in the past. Thanks to Dr. Ortega, the partnership we have fostered between Villanova and the 7x24 Exchange will continue to enhance industry knowledge by providing an academic platform to address real world challenges through the use of engineering and business analytics.”

Crocker and Cronin are in the process of establishing their own digital utility center in Princeton, New Jersey. “In the near future, we plan to make introductions to the 7x24 Exchange,” says Dr. Ortega, “I am confident that our joint investments to build the Villanova Steel ORCA Research Center will provide a positive impact on education as well as industry,” he says.

After Dr. Ortega shared the ES2 story at the 7x24 Exchange regional meeting, he was overwhelmed by the support and encouragement of the alumni and the interest from companies in Pennsylvania, New Jersey and New York. “Since the meeting, he has networked with industry leaders, made many new business contacts and generated significant interest in the activities of the Center from potential new members.

The regional meeting was not Dr. Ortega’s only opportunity to interact with the 7x24 Exchange on a large scale. Crocker, Cronin and Reusche helped take the relationship to the next level when they introduced him to the organization’s national president, Bob Cassiliano, who invited Dr. Ortega and his graduate students to attend the national 7x24 Exchange annual meeting in Orlando in June 2013. This all-expenses paid opportunity allowed Dr. Ortega to present the ES2 to data center professionals nationwide. The interest in the Center was so great that Cassiliano has asked Dr. Ortega to be one of four keynote speakers for the June 2013 national meeting. In addition to presenting ES2, there will also be an opportunity for him and Dave Crocker to announce the Steel ORCA partnership. “This invitation to speak is both a huge honor and huge opportunity,” says Dr. Ortega.

**VILLANOVA ENGINEERING LAB ENGAGES STUDENTS IN BIO-OIL RESEARCH**

Dr. Justinus Sarti and his research assistants are not afraid to get their hands – or lab coats – dirty. “No matter how many times I wash mine, even with bleach, I can’t get it clean,” says PhD chemical engineering student Nidia Rain-Felix. The student shares she’s referring to bio-crude oils, the desired end-product of research she is conducting with fellow graduate assistants Rene Garrido and Nicole Hammer. Together they are working with a dozen undergraduates, including seven seniors and a handful of freshmen, sophomores and juniors. The entire project is being supervised by Dr. Sarti and Dr. Charles Cox, both assistant professors in the College’s Department of Chemical Engineering.

Villanova University is part of a 14-member consortium led by the U.S. Department of Agriculture’s Agricultural Research Service at the Eastern Regional Research Center in Wyndmoor, Pa. With $6.8 million in funding from the Department of Energy’s Biomass Research and Development Initiative, the government, industry and academic partners of the consortium are working on converting agricultural and forestry by-product materials into bio-oils. The three-year project aims to support research, development and demonstration on utilizing lignocellulosic biomass, i.e., switchgrass, forest wood waste and animal manures, for the production of bio-crude oil via a process called fast pyrolysis. For its part, Villanova has received $300,000 in funding to develop catalytic materials for use in the catalytic pyrolysis process and for upgrading bio-crude oil. The research is compliant with the initiatives of Villanova’s Biomass Resources and Conversion Technologies (BRCT) laboratory.

“The first stage in our research is to screen different types of feed stocks to see how they work in the bio-process system,” explains graduate student Nicole Hammer. “All biomass is not created equal,” notes Dr. Sarti. Different forms – from paper mill sludge to mushroom substrates – offer varying quality and energy output as bio-oils. “The goal is to try to understand how biomass properties correlate to the quality of the bio-oil products,” says Dr. Sarti. At its most simple utilization, the bio-crude oil produced can be used as a heating oil replacement, but its heating value is low. The goal is to find catalysts which upgrade the end-product for use in gasoline and diesel fuels, and ultimately discover a replacement for fossil fuels.

Dr. Sarti is happy to point out the many opportunities that exist for interdisciplinary collaboration in the BRCT lab. From the lab’s pilot plant (the workhorse”), built by a mechanical engineering student, to the bio-lab department’s growing stock of switchgrass as energy feedstock, a variety of disciplines are involved in the process. Dr. Sarti is also delighted by the number of students, freshmen through seniors, engaged in the work. He finds, “They are driven and passionate about issues of sustainability and the environment.”

Students who take part in his freshman mini-project “Bioceft and Sustainability,” often stay committed to the work, volunteering their time throughout their undergraduate years and gaining valuable experience in the process. The BRCT lab serves as a prime example of what distinguishes an undergraduate Villanova engineering education from the competition – the opportunity for students, beginning in their first year, to learn from and work in the lab alongside graduate research assistants and their professors.

To learn more about research being conducted in Villanova’s Biomass Resources and Conversion Technologies laboratory visit www.villanova.edu/biomass.

Dr. Al Ortega and Tom Reusche ’83 EE

Villanova’s ES2 Center has been embraced by both the local chapter and national 7x24 Exchange, and Dr. Ortega gives all the credit to the Center’s industry partners. “They made it happen. These companies understand that the ES2 needs their support to survive and succeed,” he explains. To demonstrate its commitment to its member companies and to the sustainable future of its industry, the 7x24 Exchange has decided to become a member of the ES2 as well. Reusche explains the benefits of this partnership: “Members of the 7x24 Exchange can interact with Al and the research team, discuss the pertinent issues and challenges, and share their future-state vision. This interaction should help the ES2 focus on what is important to data-center-related businesses, and develop technologies these businesses will need and utilize in the future.” He and Ortega look forward to a long and productive relationship.

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**Graduate student researchers display various types of biomass materials.**

**Image 36x57 to 396x311**

**Graduate student researchers display various types of biomass materials.**

**The 7x24 Exchange regional meeting drew many Villanova alumni.**

**Image 532x639 to 766x762**

**Image 533x961 to 766x1149**